

THE COMPLEMENTARY NATURE OF FUNDAMENTAL AND TECHNICAL ANALYSIS

Evidence from Indonesia

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Fundamental analysis and technical analysis has been used independently to predict the stock price movement. Both type of analysis usually used without interacting each other. This study was intended to test the complementary nature of fundamental and technical analysis as to whether it will increase the explanatory power to explain the stock price movement in Indonesia LQ45 market. The result shows that fundamental or technical analysis alone in isolation have the ability to predict future prices. But, by integrating both factors together in a single model will give the superior explanatory power to the prediction. However, in Indonesia stock market, technical analysis plays the biggest role in determining future price movements, while technical data was widely available in the market rather than the fundamental data such as analyst's forecasted EPS. These findings prove that fundamental analysis can be used in determining which stocks or portfolio is prosperous in the future, and technical analysis can be used in determining the right time to buy or sell the stocks. By integrating both type of analysis, investors could have superior profit than the buy and hold strategy. The result should also enrich the knowledge of stock traders in gaining more profit.

Analisis fundamental dan teknikal sudah digunakan sejak lama oleh para analis untuk dapat memperkirakan pergerakan harga saham. Kedua bentuk analisis ini seringkali digunakan secara independen tanpa interaksi satu dengan lainnya. Studi yang dilakukan ini bertujuan untuk dapat melihat hubungan antara analisis teknikal dan fundamental, apakah dengan menggabungkan kedua bentuk analisis ini dapat menghasilkan sebuah prediksi yang lebih tepat terhadap pergerakan pasar saham di Indonesia. Studi ini mencakup seluruh saham yang tercantum dalam LQ45 di Bursa saham Indonesia. Hasil riset menunjukkan bahwa, baik analisis fundamental maupun teknikal secara terpisah memiliki kemampuan untuk dapat memperkirakan pergerakan harga saham. Namun dengan menggabungkan kedua analisis ini dalam sebuah model, dapat memberikan kemampuan prediksi yang lebih kuat. Pada pasar saham Indonesia, analisis teknikal memiliki kemampuan yang lebih baik dalam memperkirakan harga saham kedepannya, karena data teknikal lebih mudah diakses dan tersedia secara umum dibandingkan dengan data fundamental seperti Prediksi EPS dari Analis, yang hanya tersedia bagi pelanggan dalam jumlah kecil. Dengan menggabungkan kedua bentuk analisis ini, Investor dapat memperoleh laba yang lebih besar dibandingkan hanya menggunakan strategi beli dan simpan. Cara penggabungan kedua analisis ini adalah dimana analisis fundamental dapat digunakan untuk menentukan saham mana yang cukup baik, dan analisis teknikal dapat digunakan untuk menentukan momentum kapan untuk membeli dan menjual saham tersebut. Hasil studi ini diharapkan dapat menambah pengetahuan dari para pemain saham agar bisa memperoleh keuntungan yang maksimal.

Abstract



Keywords: Technical Analysis, Fundamental Analysis, Momentum, Book Value, Earnings per Share.

People try to predict which stocks should give them the highest return by analyzing the stock price movement. The search for the best valuation model in forecasting the movement of stock price has been an interesting topic for many researchers. Referring to Bettman et al (2009), there are two distinct types of widely used analysis. The first one is fundamental analysis and the other one is technical analysis. Both type of analysis were trying to answer the same question, but entirely different in nature).

Fundamental analyst believe that they can create profitable opportunities by isolating and quantifying information about the market, industries, and also individual companies that was not yet utilized and discovered. Technical analysts are usually short run traders, whose interests are on the capital gain. The factors and conditions observed in the market are different than those of fundamentalists. From the research done by Oberlechner (2001), technical analysis is more popular, most of them use only limited data of only lagged price and volume because these data are easily and quickly acquired, stored, and also utilized.

Bettman et al (2009) stated that Fundamental analysis and technical analysis were used independently by most stock market analyst. However, there are very few literature which integrates both measures into a single powerful model.

With the facts above about fundamental and technical analysis, the author was interested in building a valuation model integrating both type of analysis to recognize their ability to provide higher explanatory power in explaining the

stock price. This research was focused on building a valuation model which consists of both fundamental and technical factors, and testing the complementary nature in explaining the stock price movement in Indonesia.

Fundamental Analysis

Fundamental analysis was first formally argued in the share valuation exercises by Graham and Dodd (1934), which focuses the analysis on the value investing using PE, book value, and EPS ratios. The relationship of stock price and fundamental factors is also strengthened on the dividend discount model by Gordon and Shaphiro (1956), which values the stock price through the dividend paid by the company. In further studies by Ohlson(1995), dividends are not the only predictor relevant to the market value, because of one dollar of dividends displaces one dollar market value on the same date. This finding was consistent with Modigliani and Miller (1958). In this research, Ohlson (1995) finds that the core of the valuation function expresses value as weighted average of capitalized current earnings and current book value. Ohlson (1995) stated that the book values are unbiased estimators of market values in that the expected goodwill equals zero, and book value alone predicts earnings, and thus book value now suffices to determine market value.

Ohlson (1995) wrote that expected earnings for the next period alone provide sufficient information for the present value of all future expected dividends. He also wrote that firm value equals its book value adjusted for the present value of anticipated abnormal earnings. This means that additional dollar in the book value or earnings generally added

more than a dollar of market value. Finally in his theory, Ohlson (1995) expresses the price or the value of a firm's equity as a function of both earnings and book value of equity on his theory of clean surplus valuation. In this theory, the accounting format requires to earnings minus dividends should be equal to the change in book value. Ohlson (1995) also stated that the change in book value because of all changes in assets or liability which was not related to dividends should pass through the balance sheet and income statements.

These research was supported by Collins et al (1997), who also concludes that earnings and book values act as substitutes for each other in explaining prices, while they also function as complements by providing explanatory power incremental to one another. Collins et al (1997) stated the two explanations which are not mutually exclusive have been given for these findings, which book values serve as better predictor for future earnings when current earnings contain large temporary adjustment components, and book values serve as a proxy for the firm's abandonment option.

In his research, Collins et al (1997) estimates yearly cross sectional regressions for a 41-year period spanning 1953 to 1993. He uses R^2 as the primary method to measure value relevance and decompose the combined explanatory power of earnings and book values into three components:

1. Incremental explanatory power of earnings
2. The incremental explanatory power of book values
3. The explanatory power common to both earnings and book values

Further research was done by Dechow et al (1999) which augmented the Ohlson(1995) and Collins et al (1997) research of book value and earnings as future price predictor. Dechow et al (1999) founds that book value provides very little additional information about stock prices beyond that contained in analysts' forecasts of next year's earnings. Dechow et al (1999) valuation model incorporates the other information in the conditional forecast of the next period's abnormal earnings.

Dechow et al (1999) founds out that both book value and earnings load positively and significant in regressions. Dechow et al (1999) also noted the fact that the book value loads in addition to earnings indicates that book value contains value relevant information beyond those already covered in earnings. And in addition to book value and earnings, these regressions which also include the consensus analyst forecast of the next period's earnings has an increased explanatory power than only using only Ohlson's two factor model. In this research, earnings loads with a small and statistically insignificant coefficient, suggesting that analysts' forecast of next year's earnings has the same value relevant information in current earnings.

Dechow's three factor model was also supported by Ely and Waymire (1999) with the same findings that the earnings variable is more strongly associated with stock price than book value. Ely and Waymire (1999) also found that the mean and median incremental relevance for earnings exceeds those of book value. From the findings in Ely and Waymire (1999) research, the explanatory power of univariate regressions based solely on earnings exceed those of

book value concludes the importance of earnings for equity valuation.

From the research and findings above, a fundamental analysis model which was done and tested in this research consists of three factors which was the current book value, current earnings per share. To increase the explanatory power of the fundamental analysis in explaining future price, we will also include forecasted earnings per share. From the literature above, the base of this analysis is strong because it was based on prior released journals.

Technical Analysis

Schwager (2009) mentioned "While the fundamental analyst seeks the intrinsic value of the stocks and interested in the total return over a relatively long period by carefully considering dividend returns as well as expected price appreciation, technical analyst believe that those methods are inefficient". From their perspective, market conditions are complex, and analysts should also deal with market reactions. Schwager (2009) also stated that people did not always buy on good earnings reports, and did not always sell on bad news.

Technical analysis has an important role in the analyst's research for the stock price movement. Technical analysis is often discussed as it is utilized apart from fundamental analysis. It is difficult to isolate one approach entirely from the other. Technicians are usually aware of fundamental factors, and fundamentalists are also aware of market conditions, trends, and also trading volume, and also use these factors to make decisions.

The recognition of the ability of past prices and movements to predict future value was

first written on the Dow Theory, published in The Wall Street Journal by Charles Dow, 1900-1902 as written by Szabo (2004), which implicitly state that past prices and movement can forecast future prices. Because of the significance of technical analysis in its ability to predict future price, this will counter the random walk hypothesis.

In his research, Levy (1966) reports the results of tests of the profitability of some 68 variations of various trading rules of which very few that were based only on past information yielded returns higher than that given by a buy and hold policy.

In Fama's (1970), the vast majority of technical analysis studies were unable to reject the efficient market hypothesis for common stocks. There are several well-documented anomalies in the efficient market hypothesis, but many financial economists would agree with Jensen (1970) who believes that there is no other proposition in economics which has more solid empirical evidence supporting it than the efficient market hypothesis. (Lo and MacKinlay, 1999)

From the research of Jensen and Bennington (1970), random walk and efficient market theories of security price behavior imply that stock market trading rules based solely on the past price series cannot earn profits greater than those generated by a simple buy-and-hold policy. Jensen and Bennington (1970) also quoted that technical analysts insisted that this evidence does not imply their methods are invalid and argued that their rules are too complex to be captured by a simple statistical test.

Technical analysis is also emphasized in an important study Jegadeesh and Titman (1993) has documented the existence of a momentum effect. Jegadeesh and Titman (1993) attribute this effect to the fact that investors underreact to the release of firm-specific information. In this research, they write, stocks that perform the best (worst) over 3 to 12 months period tend to continue to perform well (poorly) over the next 3 to 12 months. Jegadeesh and Titman (1993) found that this evidence happened in US and Europe. Prior research proves that Japan is the only largely developed stock market which did not show this phenomenon. Seasonal changes in the trend like the January effect also hurts the momentum effect.

Further studies by Moskowitz and Grinblatt (1999) evaluate momentum in industry returns. They form several value weighted industry portfolios and rank stocks based on past industry returns. Moskowitz and Grinblatt (1999) found that high momentum industry should outperform low momentum industries in the six month after portfolio formation. In these studies, Jegadeesh and Titman (1993) stated that the profits from momentum strategies have generated consistently positive returns for at least the last 60 years in the United States. In momentum research, Jegadeesh and Titman (2001) exclude stocks with low liquidity by screening the stocks priced less than \$5 and at the smallest market cap deciles, based on the NYSE size deciles cut off. Jegadeesh and Titman (2001) also stated that momentum profits have also been found in most major developed markets throughout the world except Japan, with a statistically insignificant evidence of momentum.

Based on prior researches above, for this research, the factors used to predict future price movements were historical prices taken from the period of 3 months or more and also momentum factors, which shows the extreme momentum condition. From prior research regarding this by Bettman et al (1999), it is concluded that technical analysis was proven to significantly increases the return from trading activity.

Integration of Fundamental and Technical Analysis

Bettman et al (2009) says that both fundamental analysis and technical analysis was used independently by most stock market analyst, but there are very few literature which integrates both measures into a single powerful model. One of the research done on the complementary nature of fundamental and technical analysis was done by Taylor and Allen (1992). In this research, they conducted a survey to over 400 chief foreign exchange dealers in the London market in 1988 with 60% response rate. The result is that 90% respondents uses inputs from the chartist on technical analysis while forming their trading decisions, and 60% of the respondents judging charts as least important than fundamental analysis. Finally the research perceives that both fundamental and technical analysis is complementary.

The latest research regarding fundamental and technical analysis was done by Oberlechner (2001) with 59% of the traders are using chartist or technical analysis, 17% of the traders are using fundamental analysis, and 23% traders switch between both type of analysis.

The prior research in Bettman et al. (2009)

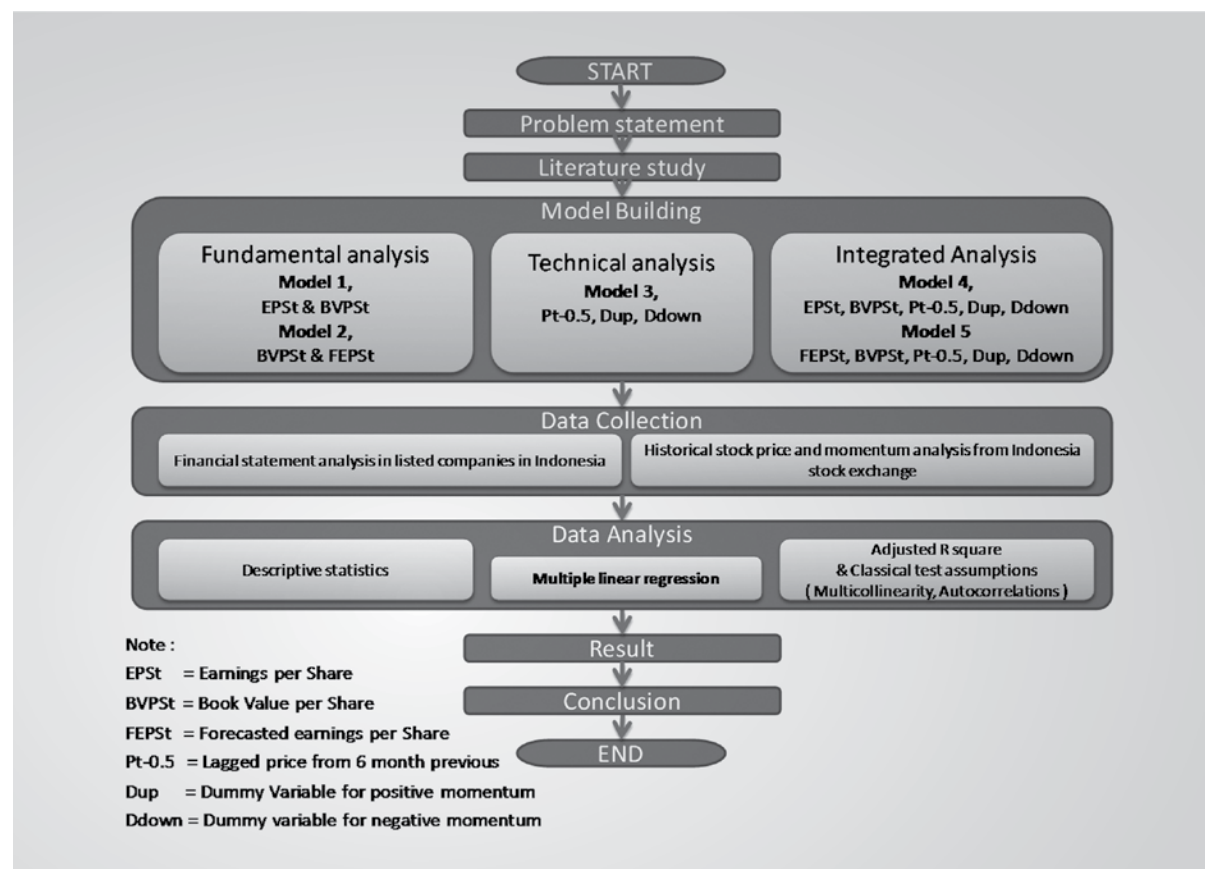
proposed the model which integrates fundamental and technical analysis to find out the potential increasing the explanatory power to future prices. The model used by Bettman et al. (2009) consists of three fundamental analysis factors from Dechow et al (1999) and also the two momentum dummy variables and a lagged price for the technical analysis factors with the result that the explanatory power is increased by applying both fundamental and technical analysis, proven by markedly higher adjusted R² compared to the model with only fundamental or technical analysis alone.

METHODS

The research consists of 5 model in order to analyze the ability of each variable in the correlation to the stock price. The fundamental factors analyzed was from the

book value per share (BVPS), earning per share (EPS), and also forecasted earning per share (FEPS). From the technical analysis side, the variable used are the lagged price from the past 6 months period and 2 dummy data to capture the extreme positive or negative holding period returns in the past 6 months period. The first 3 model will test each fundamental and technical analysis to explain the stock price on isolation, and the last 2 model will integrate both type of analysis, as described below.

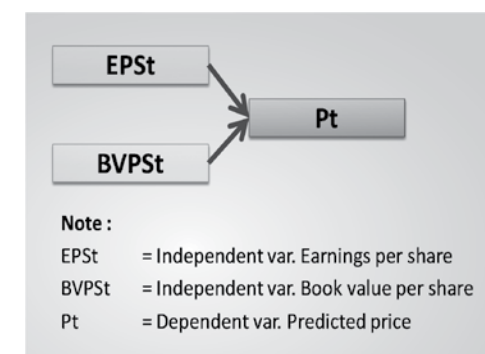
1. The basic two factor fundamental analysis model similar to Collins et al (1997) incorporating the book value per share (BVPS) and earnings per share (EPS). Previous testing of this model resulted that price is highly dependent to BVPS. Ohlson (1995) explains that BVPS represents the resources that a



firm has. Ohlson (1995) also expresses that the price or the value of the firm's equity as a function of both earnings and the book value of equity. The first model will be designed as below :

$$P_t = a + b_1 BVPS_t + b_2 EPS_t + e \quad (1)$$

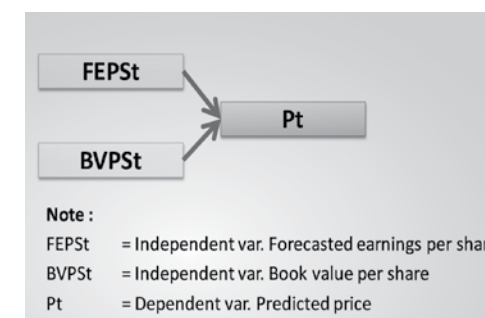
Figure 1. Model 1 Correlation Diagram



2. The second model incorporates the two factor fundamental analysis similar to Dechow et al (1999) using the forecasted earning measure to replace the earnings per share. Dechow et al (1999) argues that forecasted earnings is offering incremental information about the future prospects of the company. Similar testing in previous research resulting that forecasted EPS shows to be more significant than the EPS itself. The second model will be as follows :

$$P_t = a + b_1 BVPS_t + b_2 FEPS_t + e \quad (2)$$

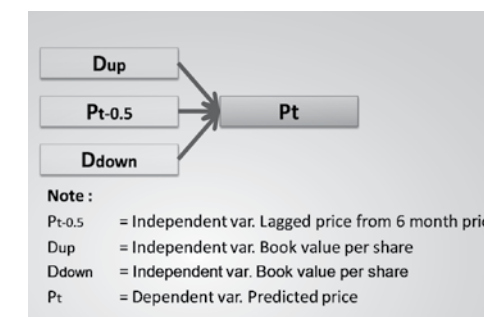
Figure 2. Model 2 Correlation Diagram



3. The third model only consists of technical analysis factor with reference to momentum factors from Jegadeesh and Titman (1993), that lagged price $P_{t-0.5}$ is one of the factor that determine the future stock price. In this research, the dummy variables are assigned based on the momentum performance measure from Jegadeesh and Titman (1993). This dummy variables are also used in Bettman et al (2009). From prior research by Bettman et al (2009), this model has more explanatory power than fundamental model(1) and model(2) above with higher adjusted R². The model will be as follows:

$$P_t = a + b_1 P_{t-0.5} + b_2 D_p + b_3 D_{down} + e \quad (3)$$

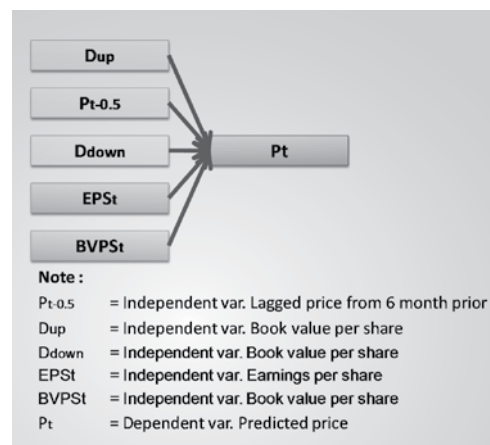
Figure 3. Model 3 Correlation Diagram



4. The integration between model (1) and (3), integrating fundamental indicators of BVPS and EPS with aforementioned technical indicators in model (3). Prior research by Bettman et al (2009), similar model is highly significant to the stock price than if model (1) and model (3) is used without interacting each other. This is also consistent with prior research from Collins et al (1997) and also Ely and Waymire (1999). The fourth model will be as follows :

$$P_t = a + b_1 BVPS_t + b_2 EPS_t + b_3 P_{t-0.5} + b_4 D_{up} + b_5 D_{down} + e \quad (4)$$

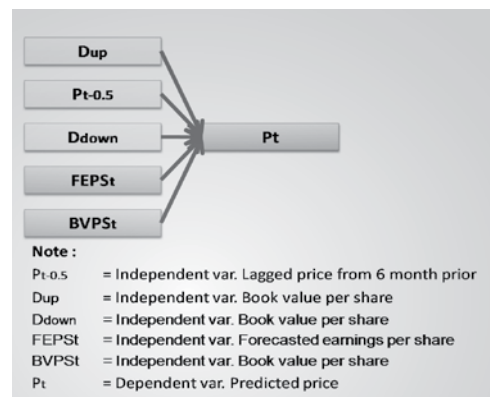
Figure 4. Model 4 Correlation Diagram



5. Model 5 is the integration between model (2) and (3) as researched by Bettman et al (2009) with the result that the more variable with additional forecasted EPS does not increase the significance level of the explanatory power of the share price. This is consistent with Dechow et al (1999) comments that the book value adds very little additional information about stock prices beyond that contained in analysts' forecasts of next year's earnings. Prior research shows that this model had a little bit better explanatory power. the model will be as follows :

$$P_t = a + b_1 BVPS_t + b_2 FEPS_t + b_3 P_{t-0.5} + b_4 D_{up} + b_5 D_{down} + e \quad (5)$$

Figure 5. Model 5 Correlation Diagram



The book value per share and earnings per share was taken from the most recently ended fiscal year. To be consistent with prior research by Bettman et al (2009), these data were excluded from the research :

- Selected stocks with BVPS less than 0
- Invalid data which was late disclosed over 90 days and not recorded on the IDX database
- All data which quality is questionable
- Stock with price less than Rp.50 as the minimum listed price

To ensure the accuracy of the data, all data was downloaded from the indonesia stock exchange database. The Dummy Variables in this research was derived from the lagged price. The use of 2 dummy variable was to reflect the extremely positive or negative stock return or the extremely negative market return as used by Bettman et al (2009). The D_{up} variable was used to flag the extremely positive momentum. The value is set to 1 when the stock holding period return in the 6 months prior is higher than the highest performance quarter of the historical 5 years stock return. This reflects the extremely bullish momentum of the stock. When the market condition is sideways or downturn, the value is set to 0. The D_{down} variable was used to flag the extremely negative momentum. The value is set to 1 when stock holding period return in the 6 months prior is lower than the lowest performance quarter of the historical 5 years stock return. This reflects the extremely bearish momentum of the stock. When the market condition is sideways or bullish, the value is set to 0.

Given the condition above, D_{up} and D_{down} variable has three conditions, either both values are 0 when the market is sideways, or either one is 1 in the bullish (D_{up}=1, D_{down}

Table 1. Variable Description

Variable	Usage	Definition
P _t	Dependent Variable Forecasted Data	The Stock price after the earnings report was released for year t. The stock price is adjusted for capitalization changes , using the adjusted close price.
P _{t-0.5}	Independent Variable Technical analysis	The stock price at the beginning of month of 6 month prior to the date of P _t . The stock price is also adjusted for capitalization changes, using the adjusted close price.
BVPS _t	Independent Variable Fundamental analysis	The book value of the outstanding shares and adjusted with capitalization changes, the data was taken from annual report of the most recent year t.
EPS _t	Independent Variable Fundamental analysis	The diluted earnings per share data of the outstanding shares and adjusted with capitalization changes. Data was taken from the annual report of the most recent year t.
FEPS _t	Independent Variable Fundamental analysis	The forecast earnings per share which was forecasted by the author using the EPS _t which could be used as the company performance forecast for period t.
D _{up}	Independent Variable Technical analysis	The dummy variable for the momentum analysis purpose. Equal to 1 when the stock holding period return of 6 month before month t compared to 5 year before is extremely positive and placed in the highest performance quarter. Otherwise, it will be set to 0.
D _{down}	Independent Variable Technical analysis	The dummy variable for the momentum analysis purpose. Equal to 1 when the stock holding period return of 6 month before month t compared to 5 year before is extremely negative and placed in the highest performance quarter, otherwise , it will be set to 0.

=0) or bearish (D_{up}=0, D_{down} =1) market condition.

The data used here has already been tested several times with the consistent output using SPSS Statistics 17 and SPSS Amos Graphics 18. The final data used for the research includes 183 firm – year observations .

The population for this research was all the listed company in Indonesia stock exchange, consisting 398 listed issuers based on IDX statistics launched in august 2009.

For the research data, the stocks were filtered using the member of LQ45 investment grade stocks as listed every second quarter of 2004 - 2009 based on Indonesian Stock exchange committee's announcement letter. The sample stocks used in this research should have positive book value.

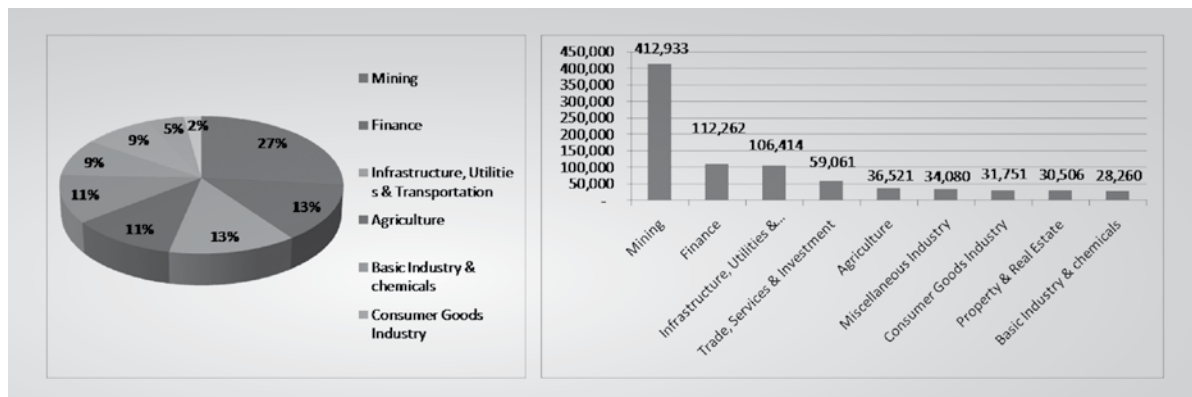
RESULTS AND DISCUSSION

Descriptive Statistics & Correlation Matrix

From the whole sample of LQ45 listed companies, the composition is as depicted below. The pie chart on the left side is the company sector composition in Indonesia. The right side bar chart shows the trading value composition of LQ45 listed companies. The highest trading value and number of companies are in the mining sector with 27% of total companies, followed by the finance at 13% and also infrastructure. This condition is due to the bullish oil price and also the large market cap of PT. Bumi Resources. This coal mining company alone covers 20% more of the total transaction in 2009.

Provided the descriptive statistics below, the range of price in Indonesia stock market is very broad. The price of stocks included in this sample is ranging from Rp.50 per share

Figure 6. Industry Sector in LQ45



up to Rp.11.947,- per share. This huge range of data is used to provide comprehensive view about the Indonesia market environment. The standard deviation for the predicted price P_t is close to the lagged price $P_{t-0.5}$ on 2303.342 and 2192.470, means that the movement of both variables are on the same range.

The dummy variables consists of 0 and 1, means that the D_{down} variable should have the negative coefficient in the regression to indicate the downturn trend of the stock market. When the D_{down} is 1, means the regression result should be affected by a negative effect.

Afterall, the descriptive statistics shown that the data was consistent with the data definition such as, stocks included in this research should be priced above Rp.50,- and having positive book value.

The correlation matrix below shows that in the $\alpha=0.05$, significant correlation exists between D_{up} and the dependent variable $P_{t-0.5}$ at -0.179. The highest Pearson correlation exists between $P_{t-0.5}$ and P_t at 0.964. This strong correlation shows high explanatory power of lagged price to predict future price. The strong correlation between the

independent variable and the dependent variable is allowed, because this will increase the predicting power of the model.

There were several negative correlations existed between D_{up} and EPS at -0.117, D_{up} and BVPS at -0.111, D_{up} with FEPS at -0.062, and D_{up} with P_t at -0.043. This negative correlations existed because the economic downturn happening between 2007 and 2009 drags the price down, given the fundamental condition of the companies was still positive. This data also showing that the economic downturn was only a technical matter.

The D_{down} dummy variable also has negative correlation to other variables such as EPS_t at -0.014, $BVPS_t$ at -0.089, P_t at -0.079, and D_{up} at -0.360. D_{down} is having negative correlations because this independent variable should have negative effect when existed as 1 in the regression model.

To complete the correlations test, we also provide the spearman correlation test. The result of both correlation methods are having the same pattern. $P_{t-0.5}$ and P_t is still highly correlated at 0.926, and D_{down} is negatively correlated to EPS_t at -0.033, $BVPS_t$ at -0.023, P_t at -0.154, and D_{up} at -0.360.

Table 2. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
YEAR	183	2005	2009	2007.19	1.343
EPSt	183	-631.0	3546.0	185.795	347.2698
BVPSt	183	50.0	6838.0	1022.484	1257.4512
FEPSt	183	-582.7	33544.2	501.479	2825.4139
Pt-0.5	183	75	10919	1898.60	2192.470
Pt	183	50	11947	2013.89	2303.342
Dup	183	0	1	.25	.432
Ddown	183	0	1	.28	.452
Valid N (listwise)	183				

Several correlations marked at two asterisks (**) were statistically significant at $\alpha=0.01$, but because this research uses $\alpha=0.05$, then this statistically significant correlations can be omitted. When all correlations testing with 2 methods concludes the same result Therefore, this correlation matrix shows that the data is valid for the regression analysis.

Durbin Watson statistics shows that all model 1 to 5 are showing negative autocorrelations, based on the Durbin Watson statistics value outside the upper and lower boundary of

positive autocorrelations. From this test, all data was valid for the regression analysis.

EPS and FEPS should not be used together in a model, because this condition will create a multicollinearity effect. From the VIF (Variable Inflation Factor) value, all models did not show any multicollinearity. All VIF values are below 5, means that those 5 models are usable for the regression.

From the heteroskedacity test using the scatter plot diagram included in the

Correlation^a

		Pt	EPSt	BVPSt	FEPSt	Pt-0.5	Dup	Ddown
Pt	Pearson Correlation	1	.477**	.643**	.058	.964**	-.043	-.079
	Sig. (2-tailed)		.000	.000	.434	.000	.563	.288
EPSt	Pearson Correlation	.477**	1	.634**	.555**	.460**	-.117	-.014
	Sig. (2-tailed)	.000		.000	.000	.000	.114	.853
BVPSt	Pearson Correlation	.643**	.634**	1	.268**	.633**	-.111	-.089
	Sig. (2-tailed)	.000	.000		.000	.000	.134	.229
FEPSt	Pearson Correlation	.058	.555**	.268**	1	.067	-.062	.094
	Sig. (2-tailed)	.434	.000	.000		.365	.408	.206
Pt-0.5	Pearson Correlation	.964**	.460**	.633**	.067	1	-.179*	.085
	Sig. (2-tailed)	.000	.000	.000	.365		.015	.255
Dup	Pearson Correlation	-.043	-.117	-.111	-.062	-.179	1	-.360**
	Sig. (2-tailed)	.563	.114	.134	.408	.015		.000
Ddown	Pearson Correlation	-.079	-.014	-.089	-.094	.085	-.360**	1
	Sig. (2-tailed)	.288	.853	.229	.206	.255	.000	

** . Correlation is significant at the 0.01 level (2-tailed)

* . Correlation is significant at the 0.05 level (2-tailed)

a. Listwise N=183

Correlation*

		Pt	EPSt	BVPSt	FEPSt	Pt-0.5	Dup	Ddown	
Spearman's rho	Pt	Correlation Coefficient Sig. (2-tailed)	1.000 .	.750** .000	.754** .000	.659** .000	.926** .000	.043 .563	-.154 .037
	EPSt	Correlation Coefficient Sig. (2-tailed)	.750** .000	1.000 .	.767** .000	.733** .000	.713** .000	-.005 .947	-.033 .653
	BVPSt	Correlation Coefficient Sig. (2-tailed)	.754** .000	.767** .000	1.000 .	.677** .000	.735** .000	-.069 .356	-.023 .760
	FEPSt	Correlation Coefficient Sig. (2-tailed)	.659** .000	.733** .000	.677** .000	1.000 .	.621** .000	.008 .910	.017 .820
	Pt-0.5	Correlation Coefficient Sig. (2-tailed)	.926** .000	.713** .000	.735** .000	.621** .000	1.000 .	-.182* .014	.074 .317
	Dup	Correlation Coefficient Sig. (2-tailed)	.043 .563	-.005 .947	-.069 .356	.008 .910	-.182* .014	1.000 .	-.360** .000
	Ddown	Correlation Coefficient Sig. (2-tailed)	-.154 .037	-.033 .653	-.023 .760	.017 .820	.074 .317	-.360** .000	1.000 .

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)
a. Listwise N=183

Data validation & Regression Testing

Data Testing	Model 1	Model 2	Model 3	Model 4	Model 5
Autocorrelation					
Durbin Watson	0.698	0.672	2.025	1.999	1.985
Multi Collinearity					
VIF Value					
BVPSt	1.673	1.077		2.297	1.923
EPSt	1.673			1.694	
FEPSt		1.077			1.123
Pt-0.5			1.034	1.749	1.783
Ddown			1.149	1.196	1.220
Dup			1.179	1.186	1.184
Heteroskedacity					
pattern exists?	No	No	No	No	No

█ = Multicollinearity exists

appendix, the heteroskedastic pattern is not existed. By this finding, the test data is free from heteroskedacity, and valid for testing.

From the regression result below, for the fundamental analysis model, only model 2 shows that book value and forecasted EPS was significant. In the technical analysis model 3, All variables are highly significant

in explaining the stock price. But for the integrated model, only earnings per share as the fundamental factor in model 4 that was still positively significant when integrated with the technical factors.

Using $\alpha = 0.05$ and degree of freedom of 183, in model 1, earnings was not significant at $p=0.114$. In model 4, earnings and book

Regression Statistics		Model 1	Model 2	Model 3	Model 4	Model 5
Constant	Coefficient	804.559	798.418	113.891	91.989	1.025
	Standard Error	168.063	167.266	58.581	60.583	0.020
	p value	-	-	0.053**	0.131**	0.134**
BVPSt	Coefficient	1.042	1.238		0.007	0.042
	Standard Error	0.134	0.107		0.040	0.037
	p value	-	-		0.870**	0.259**
EPSt	Coefficient	0.772			0.240	
	Standard Error	0.486			0.125	
	p value	0.114**			0.056**	
FEPSt	Coefficient		0.100			0.003
	Standard Error		0.048			0.013
	p value		0.038			0.808**
Pt-0.5	Coefficient			1.041	1.021	1.025
	Standard Error			0.016	0.020	0.020
	p value			-	-	-
Ddown	Coefficient			(669.880)	(653.083)	(652.361)
	Standard Error			19.563	80.418	82.056
	p value			-	-	-
Dup	Coefficient			463.654	476.824	470.969
	Standard Error			84.393	83.858	84.664
	p value			-	-	-

* All values are calculated on 95% Confidence level
** = Insignificant coefficient

value also not significant at p value of 0.056 and 0.870. While forecasted earnings and book values in model 5 is also insignificant with p value of 0.259 and 0.808. These numbers are higher than the $\alpha = 0.05$ value, meaning that in model 4 and 5, book values are no longer significant when integrated with the technical factors. The other p values are significant. Given these numbers, the high significance of lagged price and momentum dummy variables dismisses the book value, earnings, and forecasted earnings.

D_{down} coefficient was always negative, shown in model 3 for -669.860, model 4 for -653.083, and for model 5 for -652.361. These numbers indicates that when D_{down} dummy variable existed in the model, and

the value is set to 1, this variable will provide negative effect in the whole model.

From the regression result shown below, model 1 with EPS and BVPS fundamental factors has an adjusted R^2 for 0.415. Model 2 with FEPSt increased the predictive power with an adjusted R^2 for 0.421. Model 3 which consists only technical factors of lagged price $P_{t-0.5}$, D_{down} , and D_{up} had sharply increased the predictive power much higher than the previous models with the adjusted R^2 value up to 0.961.

By integrating the fundamental factor of BVPS and EPS with technical factor of lagged price $P_{t-0.5}$, D_{down} , and D_{up} in model 4, the predictive power was higher than the previous models with the adjusted R^2 value

Regression Statistics	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Value of R ²	0.421	0.427	0.962	0.963	0.962	0.963
Adjusted R ²	0.415	0.421	0.961	0.962	0.961	0.962
F Significance	65.560	67.150	1.510.089	924.186	904.778	1.161.576
F table	3.000	2.600	2.370	2.210	2.210	2.210

up to 0.962, with EPS as the only significant fundamental factor. The last model 5 with FEPS replacing EPS does not increase the predictive power higher than model 4, but this model was still statistically significant with the adjusted R² value up to 0.961.

The F-test result shows that the most significant factor in these models are model 3, consisting only technical factors with the F significance value of 1510.089. All F values are significant which concludes that all models are statistically valid for predictions.

Discussion

The first model 1 and model 2 only uses fundamental factors to explain prices. From model 1, the testing with the IDX data resulted that price is positively dependent on book value per share, which is consistent with the theory of clean surplus by Ohlson (1995) who stated that book value as the main estimators for share price.

When the book value per share was combined with earnings per share, earnings per share is less significant to price because of the high correlation between book value and earnings at 0.634, which should be significant with $\alpha=0.01$. The finding is consistent with Dechow et al (1999) which states that the book value contains value relevant information beyond that already contained in earnings, but they load positively and significantly in regressions. From model 1, the adjusted R² value is statistically significant at 41.50% means that

this model is still able to predict the future price.

It seems that book value is the most significant predictor in the fundamental analysis model 1 and 2, this condition is consistent with Ohlson (1995) which stated that book value are unbiased estimators of market values in that the expected goodwill equals zero, and book value alone predicts earnings, thus it suffices to determine market value. This statement from Ohlson (1995) is consistent with the findings in model 1 and 2, which book value has the highest t value at 7.761 and 11.543. This t value is much higher than the other fundamental factors such as EPS and also forecasted EPS. In model 1, the high significance of book value merely dismisses the significance of EPS in determining the stock price with the t value of only 1.587.

The result of model 1 also confirms the research of Collins (1997) who concluded that earnings and book values act as substitutes for each other in explaining price, while they also function as complements by providing explanatory power incremental to one another.

The use of forecasted earnings per share to replace earnings per share on model 2 increases the explanatory power shown by the higher adjusted R² value up to 42.10%. This is also consistent with Dechow et al (1999) which also states that the addition of forecasted earnings per share increases the

explanatory power than only using Ohlson's (1995) two factor model. The testing result shows that the forecasted earnings variable is still statistically significant in this model.

The small increase of explanatory power when we replace EPS with forecasted EPS seen from the increased adjusted R² value from 41.50% to 42.10% is consistent to Dechow et al (1999). He stated that analyst forecast of next year's earnings has the same value relevant information in current earnings. This is why the significance only increased a bit in model 2. Ely and Waymire (1999) research shows the same findings that the additional of earnings variable will have an increased explanatory power than only using book value alone.

Model 3 is purely using technical analysis to predict the future price. Consistent with prior research by Bettman et al. (2009), all technical factors are significant. This result is consistent with the Charles Dow theory, that past prices can predict future price.

The momentum effect in Indonesia is highly clear in the charting. It can be easily seen from the sharp upturn and downturn of the market recently. For example, in the bullish market at 2007, the composite index can climb from around 1.000 up to 2.500 just in one year. But in the bearish market at 2009, the composite falls from 2.700 to 1.200 just in 4 months. This proves the great momentum effect in Indonesia.

The previous model 1 to 3 analyzes the explanatory power of the fundamental and technical factors in isolation without any interaction. When both factors were combined in model 4 without including the forecasted earnings in the model proves to

increase the explanatory power with the higher adjusted R² value at 96.20%.

When the price is integrated with the momentum effect from Jegadeesh and Titman (1993), this finding also showing the momentum effect that stocks which performs well at the last 3 to 12 months will tend to perform the same for the next 3 to 12 months. The ability of technical analysis alone in model 3 to predict future prices is a lot higher than the fundamental analysis from model 1 and 2, shown with the higher adjusted R² value up to 96.10 %.

The result in model 5 is that the book value and forecasted earnings are being the positive explainer to the future price. The use of forecasted earnings merely decrease the explanatory power than model 4. This is also consistent with the findings in model 2 and also with Dechow et al (1999) who says the information in the forecasted earnings is the same as contained in earnings itself. However, the adjusted R² value was still around 96.10%.

When fundamental factors were integrated with technical factors, the price is no longer positively dependent with the book value. All the other factors are still statistically significant to price. The high predictive power of technical factors dismisses the explanatory power of book value per share. This result is consistent with prior research from Bettman et al (2009) which consists of several fundamental factors combined with lagged price and two dummy momentum variables.

Technical analysis itself plays major role in Indonesian trading environment, shown from the huge difference of adjusted R²

value from 42.10% with fundamental factors alone up to 96.10 % with the technical analysis alone. The most significance explainer is the lagged price itself, shown by the highest correlation between lagged price and predicted price up to 0.964 in the correlation matrix.

MANAGERIAL IMPLICATIONS

This study shows that in Indonesia, for the fundamental analysis alone, book value is the best predictor in explaining the stock price with the highest significance among the forecasted EPS and EPS variable. The addition of EPS as complement increases the explanatory power of book value. Forecasted EPS also has a significant effect in explaining stock price, but because it is not publicly available, the forecasted EPS didn't load much in the model's predictive power.

In Indonesia, most of the stock broker service provide charting service on their portal, so many investors can see the movement of stock prices and the trend beyond it. This condition promotes the usage of technical analysis based on charts and price movements alone. With more people responds to the price movements, the lagged price became a very significant factor in determining their trading decisions. For example, when one stock had ever reaches a new high price level, people tend to believe that the price will try to break that level somewhere in the future. This condition make people rely heavily on the past price level to determine the buy or sell time.

The research result shows that fundamental or technical analysis alone in isolation can give enough explanatory power to

predict future prices, but in Indonesia, technical analysis plays the biggest role in determining future price movements. These findings dismisses the random walk theory and also prove that momentum factor is existed in the Indonesian stock market.

By having the information that the technical analysis can give higher explanatory power, traders in Indonesia can get a high momentum profits by using technical analysis alone, and this also as a proof that momentum effect which was found in most major developed markets throughout the world except Japan, also works in Indonesia stock exchange.

The low explanatory power of forecasted EPS in this model is because forecasted EPS is not available to public in Indonesia. In normal condition, when general investors didn't have any access to this data, they didn't made their trading decisions based on this data.

Adjusted R² values in this study also concludes that the integrated fundamental and technical analysis model provides greater explanatory power than those in isolation. This complementary nature of technical and fundamental analysis is consistent with a survey from Taylor and Allen (1992) that traders can use both chartist input from technical analysis for the good timing to enter or exit the market, and also fundamental analysis to select the good portfolio.

CONCLUSION

This research was focused in the ability of integrated fundamental and technical factors in determining the future prices. The result of this research concludes that in

Indonesia stock market , technical analysis takes much greater role in determining future prices than the fundamental analysis alone. The availability of momentum effect dismisses random walk hypothesis. Integrating fundamental and technical analysis in the model will provide superior explanatory power than fundamental or technical analysis alone. This was shown by higher adjusted R² values from the integrated model.

Finally, fundamental analysis can be used in determining which stocks or portfolio is prosperous in the future, and technical analysis can be used in determining the right time to buy or sell the stocks. By

integrating both type of analysis, investors can get superior profit than the buy and hold strategy.

This research is only using samples from LQ45, and only done with 5 years time period and for further research, can be expanded up to the whole Indoensian stock exchange member for longer time period, so the data will be more representative and more complete than current research.

This research can also be enriched by adding more factors which are statistically significant when integrated in each fundamental or technical analysis, to find the best fit for Indonesian stock market. ■

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